

ATTORNEY DOCKET NO. E. BRAUN 1-18-5

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant: Linda M. Braun, *et al.*

Serial No.: 09/773,844

Filed: February 1, 2001

Title: VARIABLE OPTICAL DELAY LINES AND METHODS FOR  
MAKING THE SAME

Grp./A.U.: 2871

Examiner: Wang, George

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

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ATTENTION: Board of Patent Appeals and Interferences

Sirs:

**APPEAL BRIEF UNDER 37 C.F.R. §41.37**

This is an appeal from a Final Rejection dated October 1, 2004, of Claims 1-3, 6 and 8-11.

The Appellants submit this Brief with the statutory fee of \$ 500.00 as set forth in 37  
C.F.R. §41.20(b)(2), and hereby authorize the Commissioner to charge any additional fees connected  
with this communication or credit any overpayment to Deposit Account No. 08-2395.

This Brief contains these items under the following headings, and in the order set forth below in accordance with 37 C.F.R. §41.37(c)(1):

- I. REAL PARTY IN INTEREST
- II. RELATED APPEALS AND INTERFERENCES
- III. STATUS OF CLAIMS
- IV. STATUS OF AMENDMENTS
- V. SUMMARY OF CLAIMED SUBJECT MATTER
- VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL
- VII. APPELLANTS' ARGUMENTS
- VIII. APPENDIX A - CLAIMS

## I. REAL PARTY IN INTEREST

The real party in interest in this appeal is the Assignee, Lucent Technologies Inc.

## II. RELATED APPEALS AND INTERFERENCES

No other appeals or interferences will directly affect, be directly affected by, or have a bearing on the Board's decision in this appeal.

## III. STATUS OF THE CLAIMS

Claims 1-3, 6 and 8-11 are pending in this application and have been rejected under §103(a). Each of the pending claims are being appealed.

## IV. STATUS OF THE AMENDMENTS

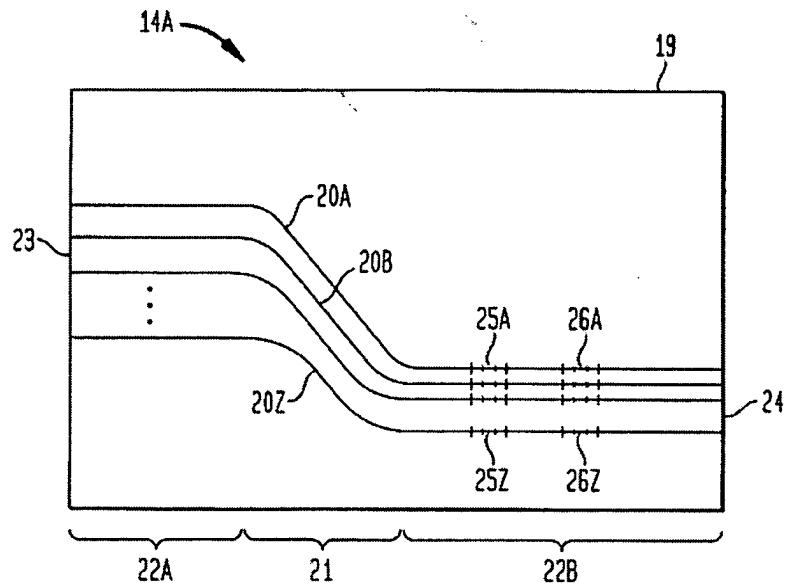
The present Application was filed on February 1, 2001. The Appellants filed a first Amendment on November 18, 2002 in response to a first Examiner's Action mailed June 18, 2002. The Examiner subsequently issued a first Final Rejection on December 24, 2002, that maintained the previous rejection. The Appellants then filed a second Amendment on February 18, 2003. On March 11, 2003, the Examiner issued a first Advisory Action. Thereafter, on March 24, 2003, the Appellants filed a CPA. The Examiner then issued a second non-final Examiner's Action on April 23, 2003. The Appellants filed a response to the second non-final Examiner's Action on September 17, 2003. The Examiner then issued a second Final Examiner's Action on December 3, 2003, which was followed by the filing of an RCE and preliminary amendment by the Appellants on December 23, 2003. The Examiner then issued a third non-final Examiner's Action on March 1, 2004. The

Appellants responded to the third non-final Examiner's Action on June 1, 2004. The Examiner then issued a third Final Examiner's Action on October 1, 2004. The Appellants responded to the third Final Examiner's Action on November 1, 2004. The Examiner then issued an Advisory Action on November 26, 2004, after which the Appellants filed a Notice of Appeal on December 8, 2004.

#### V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention is directed, in general, to a variable optical delay line, and, more specifically, to a variable optical delay line for providing both coarse and small (e.g., fine) delay increments. (*See pages 3-6, of the as filed application*) The present invention, per independent Claim 1, introduces a plurality of fibers disposed in a closely spaced array, the array comprising a first parallel region (22a), a curved region (21), and a second parallel region (22b); each fiber having a first end (23) disposed in a first linear array and a second end (24) disposed in a second linear array. (FIG. 2, Illustration 1) The curved regions (21) of the fibers differ in radii of curvature to provide a successive series of monotonically different path lengths, the path lengths differing by a few millimeters or less to provide small delay time increments. Additionally, per independent Claim 1, the variable optical delay line includes separately switchable reflectors (25a-z and 26 a-z) disposed in each of the fibers, the reflectors (25a-z and 26 a-z) switchable between reflection and transmission to provide coarse delay increments.

*FIG. 2*



**Illustration 1**

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The issue presented for consideration in this appeal is whether Claims 1-3, 6 and 8-11, as rejected by the Examiner, are patentably nonobvious in accordance with 35 U.S.C. §103(a) over U.S. Patent No. 5,729,642 to Thaniyavarn (“Than”) in view of U.S. Patent No. 4,671,605 to Soref (“Soref”) and U.S. Patent No. 5,793,508 to Meli (“Meli”).

VII. APPELLANTS’ ARGUMENT

Rejection under 35 U.S.C. 103(a) over Than in view of Soref and Meli

The inventions set forth in independent Claim 1 and its dependent claims are not obvious over the references on which the Examiner relies.

#### A. Rejection of Claim 1

Than, Soref and Meli, whether alone or in combination, fail to teach or suggest every claimed element of independent Claim 1. Specifically, independent Claim 1 currently includes a number of elements each of which is neither taught nor suggested in the references. One such element is the claimed element that each of the plurality of fibers contains a separately switchable reflector, each of the separately switchable reflectors capable of being switched between reflection and transmission. Another such element is the claimed element that the curved regions of the fibers differ in radii of curvature to provide a successive series of monotonically different path lengths, the path lengths differing by a few millimeters or less to provide small delay time increments.

With regard to the first missing element, the Examiner stated in the most recent Examiner's Action that Than fails to teach or suggest this element. (Page 3, second paragraph, of the Examiner's Action dated October 1, 2004). Accordingly, the Appellants must only establish that both Soref and Meli fail to teach or suggest this claimed element to establish that the combination also fails to teach or suggest it. The Appellants are of the strong belief that both Soref and Meli do fail to teach or suggest this claimed element.

Meli is directed to a wavelength division multiplexing telecommunications system and a method for providing a controlled separation of the output channels. (Title) Meli teaches that its wavelength division multiplexing telecommunications system uses Bragg gratings. However, Meli teaches that its Bragg gratings reflect the radiation in a narrow wavelength band and transmit the radiation that is outside of that band. One skilled in the art, thus, understands that Meli is teaching and suggesting that its Bragg gratings are acting as a filter and not a switch. Again, independent

Claim 1 requires separately switchable reflectors capable of being switched between reflection and transmission, and not a Bragg grating functioning as a filter, as taught by Meli.

Additionally, even though the Bragg gratings of Meli may be tuned, they may only be tuned during their manufacture. Accordingly, the Bragg gratings of Meli are locked in for a single use after they have initially been tuned. Therefore, the Bragg gratings of Meli are not switchable during operation, or so called on the fly, as the switchable reflectors of the present invention are. The main distinction being made here is that the Bragg gratings of Meli are tunable during their manufacture and the switchable reflectors of Claim 1 are switchable during operation. There is a distinct difference between a device being capable of doing something during its manufacture and another device being capable of doing something similar, if it can even be called that, during its operation. As the Board of Appeals is aware, the Examiner should not be drawing a correlation between a completed device, as claimed in independent Claim 1, and a partially completed device that will not retain the feature at issue after its completion. Therefore, Meli fails to teach or suggest this element. Soref, on the other hand, is not being offered for the teaching that the plurality of separately switchable reflectors are switchable between reflection and transmission. Nevertheless, Soref also fails to teach or suggest this claimed element.

With regard to the second missing element, none of the references teaches or suggests that the curved regions of the fibers differ in radii of curvature to provide a successive series of monotonically different path lengths, the path lengths differing by a few millimeters or less to provide small delay time increments. For instance, Than does not teach or suggest that the path lengths differ by a few millimeters or less to provide a series of small, selectable delay increments. In Than, path-length variation is strictly incidental to other features that are not related to the present

invention's goal of obtaining small, selectable delay increments. This is clear because Than provides no guidance, not even a suggestion, about how much the path lengths should differ from one another, and especially not a teaching that they differ by a few millimeters or less. In fact, with respect to Fig. 3 of Than, Than actually teaches that the respective path lengths may vary greatly. Great variations would be incompatible with the goal of obtaining small, selectable delay increments. Thus, not only does Than fail to teach or suggest every feature of the present invention, but moreover Than contains at least one particular teaching that leads away from the present invention. Soref and Meli, on the other hand, are not being offered for the teaching that the fibers differ in radii of curvature to provide a successive series of monotonically different path lengths, the path lengths differing by a few millimeters or less to provide small delay time increments. Nevertheless, Soref and Meli also fail to teach or suggest this claimed element.

As each of the references, that is Than, Meli and Soref, alone fail to teach or suggest the aforementioned claimed elements, the combination must also fail to teach or suggest these elements. Therefore, the combination of references has failed to establish a *prima facie* case of obviousness with respect to these elements. Claim 1 is therefore not obvious in view of Than, Meli and Soref.

Accordingly, Claim 1 is not unpatentable in view of the cited combination of Than, Meli and Soref. The Appellants, therefore, respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claim 1.

## B. Rejection of Claim 2

The Examiner has rejected Claim 2 under 35 U.S.C. §103(a) as being unpatentable over the cited combination of Than, Soref and Meli. The above argument establishing the nonobviousness

of independent Claim 1 is incorporated herein by reference. Dependent Claim 2 additionally requires that the delay line of Claim 1 further includes a MEMs mirror optical switch optically coupled to the plurality of fibers for switching at least one optical input signal among the fibers of the plurality. Than, Soref and Meli, however, do not teach or suggest that the delay line of claim 1 further includes a MEMs mirror optical switch optically coupled to the plurality of fibers for switching at least one optical input signal among the fibers of the plurality, in combination with the base claim limitations. Thus, the cited combination of Than, Soref and Meli does not establish a *prima facie* case of obviousness of dependent Claim 2. Accordingly, Claim 2 is nonobvious over Than, Soref and Meli, and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claim 2.

### C. Rejection of Claim 3

The Examiner has rejected Claim 3 under 35 U.S.C. §103(a) as being unpatentable over the cited combination of Than, Soref and Meli. The above argument establishing the nonobviousness of independent Claim 1 is incorporated herein by reference. Dependent Claim 3 additionally requires that the separately switchable reflectors comprise reflective Bragg gratings. Than, Soref and Meli, however, do not teach or suggest that the separately switchable reflectors comprise reflective Bragg gratings, in combination with the base claim limitations. Thus, the cited combination of Than, Soref and Meli does not establish a *prima facie* case of obviousness of dependent Claim 3. Accordingly, Claim 3 is nonobvious over Than, Soref and Meli, and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claim 3.

D. Rejection of Claim 6

The Examiner has rejected Claim 6 under 35 U.S.C. §103(a) as being unpatentable over the cited combination of Than, Soref and Meli. The above argument establishing the nonobviousness of independent Claim 1 is incorporated herein by reference. Dependent Claim 6 additionally requires that the separately switchable reflectors comprise reflective Bragg gratings formed in the second parallel regions. Than, Soref and Meli, however, do not teach or suggest that the separately switchable reflectors comprise reflective Bragg gratings formed in the second parallel regions, in combination with the base claim limitations. Thus, the cited combination of Than, Soref and Meli does not establish a *prima facie* case of obviousness of dependent Claim 6. Accordingly, Claim 6 is nonobvious over Than, Soref and Meli, and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claim 6.

E. Rejection of Claim 8

The Examiner has rejected Claim 8 under 35 U.S.C. §103(a) as being unpatentable over the cited combination of Than, Soref and Meli. The above argument establishing the nonobviousness of independent Claim 1 is incorporated herein by reference. Dependent Claim 8 additionally requires that the plurality of fibers are secured to a substrate of sheet material. Than, Soref and Meli, however, do not teach or suggest that the plurality of fibers are secured to a substrate of sheet material, in combination with the base claim limitations. Thus, the cited combination of Than, Soref and Meli does not establish a *prima facie* case of obviousness of dependent Claim 8. Accordingly, Claim 8 is nonobvious over Than, Soref and Meli, and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claim 8.

#### F. Rejection of Claim 9

The Examiner has rejected Claim 9 under 35 U.S.C. §103(a) as being unpatentable over the cited combination of Than, Soref and Meli. The above argument establishing the nonobviousness of independent Claim 1 is incorporated herein by reference. Dependent Claim 9 additionally requires that the at least one optical input signal is a single optical input signal and the optical switch comprises a 1XN MEMs mirror optical switch. Than, Soref and Meli, however, do not teach or suggest that the at least one optical input signal is a single optical input signal and the optical switch comprises a 1XN MEMs mirror optical switch, in combination with the base claim limitations. Thus, the cited combination of Than, Soref and Meli does not establish a *prima facie* case of obviousness of dependent Claim 9. Accordingly, Claim 9 is nonobvious over Than, Soref and Meli, and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claim 9.

#### G. Rejection of Claim 10

The Examiner has rejected Claim 10 under 35 U.S.C. §103(a) as being unpatentable over the cited combination of Than, Soref and Meli. The above argument establishing the nonobviousness of independent Claim 1 is incorporated herein by reference. Dependent Claim 10 additionally requires that the at least one optical input signal comprises a plurality of optical input signals and the optical switch comprises on NXN MEMs mirror optical switch. Than, Soref and Meli, however, do not teach or suggest that the at least one optical input signal comprises a plurality of optical input signals and the optical switch comprises on NXN MEMs mirror optical switch, in combination with the base claim limitations. Thus, the cited combination of Than, Soref and Meli does not establish

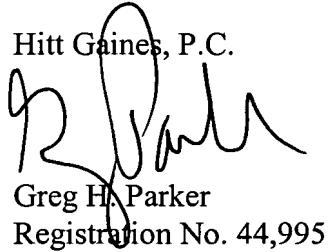
a *prima facie* case of obviousness of dependent Claim 10. Accordingly, Claim 10 is nonobvious over Than, Soref and Meli, and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claim 10.

#### H. Rejection of Claim 11

The Examiner has rejected Claim 11 under 35 U.S.C. §103(a) as being unpatentable over the cited combination of Than, Soref and Meli. The above argument establishing the nonobviousness of independent Claim 1 is incorporated herein by reference. Dependent Claim 11 additionally requires that the at least one optical input signal comprises a plurality of optical input signals having respectively different wavelengths. Than, Soref and Meli, however, do not teach or suggest that the at least one optical input signal comprises a plurality of optical input signals having respectively different wavelengths, in combination with the base claim limitations. Thus, the cited combination of Than, Soref and Meli does not establish a *prima facie* case of obviousness of dependent Claim 11. Accordingly, Claim 11 is nonobvious over Than, Soref and Meli, and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claim 11.

For the reasons set forth above, the Claims on appeal are patentably nonobvious over the cited combination of Than, Soref and Meli. Accordingly, the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of all of the Appellants' pending claims.

Respectfully submitted,

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## VIII. APPENDIX A - CLAIMS

1. A variable optical delay line comprising:

a plurality of fibers disposed in a closely spaced array, the array comprising a first parallel region, a curved region, and a second parallel region; each fiber having a first end disposed in a first linear array and a second end disposed in a second linear array, the curved regions of the fibers differing in radii of curvature to provide a successive series of monotonically different path lengths, the path lengths differing by a few millimeters or less to provide small delay time increments;

separately switchable reflectors disposed in each of the fibers, the reflectors switchable between reflection and transmission to provide coarse delay increments.

2. The delay line of claim 1 further including a MEMs mirror optical switch optically coupled to the plurality of fibers for switching at least one optical input signal among the fibers of the plurality.

3. The delay line of claim 1 wherein includes a the separately switchable reflectors comprise reflective Bragg gratings.

Claims 4-5 were previously canceled without prejudice or disclaimer.

6. The delay line of claim 3 wherein the reflective Bragg gratings are formed in the second parallel regions.

Claim 7 was previously canceled without prejudice or disclaimer.

8. The delay line of claim 1 wherein the plurality of fibers are secured to a substrate of sheet material.

9. The delay line of 1 claim 2 wherein the at least one optical input signal is a single optical input signal and the optical switch comprises a 1XN MEMs mirror optical switch.

10. The delay line of claim 2 wherein the at least one optical input signal comprises a plurality of optical input signals and the optical switch comprises on NXN MEMs mirror optical switch.

11. The delay line of claim 2 wherein the at least one optical input signal comprises a plurality of optical input signals having respectively different wavelengths.

Claims 12-20 were previously canceled without prejudice or disclaimer.